PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 94946/MRO	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/AU2003/001018**	International Filing Date *(day/month/year)* 12 August 2003	Priority Date *(day/month/year)* 12 August 2002
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] C07K 19/00; A61K 39/09, 39/00; A61P 15/18; 1/04		
Applicant THE COUNCIL OF THE QUEENSLAND INSTITUTE OF MEDICAL RESEARCH et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheet(s).

3. This report contains indications relating to the following items:

   I ☒ Basis of the report

   II ☐ Priority

   III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   IV ☐ Lack of unity of invention

   V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   VI ☐ Certain documents cited

   VII ☐ Certain defects in the international application

   VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of the report
22 January 2004	10 December 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **L.F. McCAFFERY** Telephone No. (02) 6283 2573

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU2003/001018

I. Basis of the report

1. With regard to the **elements** of the international application:*

[X] the international application as originally filed.

[ ] the description, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of

[ ] the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages , received on with the letter of

[ ] the drawings, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of

[ ] the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

[ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

[ ] the language of publication of the international application (under Rule 48.3(b)).

[ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. [ ] The amendments have resulted in the cancellation of:

[ ] the description, pages

[ ] the claims, Nos.

[ ] the drawings, sheets/fig.

5. [ ] This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU2003/001018

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 4 to 6, 14, 18 to 20, 22 to 25, 28, 29, 31 to 50, 71 to 84, 87 to 90, 94 to 114	**YES**
	Claims 1 to 3, 7 to 13, 15 to 17, 21, 26, 27, 30, 51 to 70, 85, 86 and 91 to 93	**NO**
Inventive step (IS)	Claims	**YES**
	Claims 1 to 114	**NO**
Industrial applicability (IA)	Claims 1 to 114	**YES**
	Claims	**NO**

2. Citations and explanations (Rule 70.7)

The present claims define lipopeptides comprising a T-helper cell epitope and a B-cell epitope, in which one or more internal lysine (or lysine analogue) residues is covalently attached to a lipid moiety via the epsilon-amino group or terminal side-chain group. The resulting lipopeptides are employed in compositions and methods to elicit an immune response.

The following citations are referred to in this report:

D1 WO 1993/022343

D2 NARDIN et al., The Journal of Immunology, 2001, 166, pp. 481-489

D3 BOECKLER et al., Eur. J. Immunol., 1999, 29, pp. 2297-2308

D4 GHOSH et al., International Immunology, 1999, 11(7), pp. 1103-1110.

D1 and D2 disclose dendrimeric multi-antigen systems in which multiple B-cell and T-helper cell epitopes are attached to a dendrimeric core that is further attached through an internal lysine to a lipophilic group. These render the invention as defined by Claims 1 to 3, 7 to 13, 15 to 17, 21, 26, 27, 30, 51 to 70, 85, 86 and 91 to 93 lacking in novelty. The claims as a whole are further considered to lack inventive step in view of these citations. The problem to be solved is the generation of an immunogenic response in proteins that comprise both T-helper and B cell epitopes without the associated side effects caused by carriers. D1 and D2 both disclose fusion proteins of this type, but in which the epitopes are liked via dendrimeric core proteins. The use of lipophilic groups attached via an internal lysine is also disclosed. The skilled person would be reasonably expected to ascertain these documents by routine means (for example a search of the literature on immunology), and would be expected to consider the document relevant as they deal with the same problem. As a matter of routine, the teaching of the prior art would be adapted to non-dendrimeric proteins and would be expected to similarly overcome the problem. Accordingly the claims as a whole are considered to lack inventive step.

D3 discloses constructs in which B-cell and T helper cell epitopes are conjugated to a liposome, and a lipophilic group attached via a lysine side chain to the T helper cell. This citation does not teach or suggest the constructs of the present claims, which are accordingly novel and inventive in view of D3.

Continued.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of V.2

D4 discloses the use of fusion proteins comprising B-cell and T-helper cell epitopes to elicit immune responses, and particularly induce sterility in mice. These constructs lack the lipophilic groups attached via an internal lysine group, and accordingly the present claims are considered novel in view of D4.

However the teaching of this citation when combined with that of either D1 and D2 renders the present claims lacking in inventive step. D1 and D2 disclose the use of lipophilic groups on internal lysine residues as a means of improving the properties of polyepitopic peptides, particularly those comprising B-cell and T helper epitopes. D4 discloses the use of linear peptides comprising such epitopes as contraceptive agents. In the absence of submissions that establish otherwise, the skilled person would reasonably be expected to combine the teachings of these documents to arrive at the present invention. Accordingly the present claims are considered to lack inventive step in view of the teaching of D4 in combination with either D1 or D2.

The claims are considered industrially applicable in view of the purported pharmaceutical uses of the antigenic proteins.